Keynote: Autonomous and Autonomic Systems: Paradigm for Engineering Effective Software Based Systems

Autonomous and Autonomic Systems :: Paradigm for Engineering Effective Software-Based Systems ?

Keynote

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***Abstract*—**The Autonomous and Autonomic Systems initiative has as its vision the creation of self-directed and self-managing systems to address today's concerns of complexity and total cost of ownership while meeting tomorrow's needs for pervasive and ubiquitous software-based computation and communication.

The future of computing and communications is being researched under many areas; including cloud, grid, utility, pervasive, ubiquitous, invisible, world, ambient, paint and so forth.

The driving force behind these future paradigms of computer-based systems is the increasing convergence between proliferation of devices, wireless networking, and mobile software.

Weiser first described what has become known as ubiquitous computing as the move away from the "dramatic" machine, where hardware and software's focus was on being so exciting that we as users would not want to be without it, towards making the machine "invisible", so embedded in our lives it is used without thinking or recognising it as computing.

Behind these different terms and research areas, lie three key properties: nomadic, embedded and invisible. In effect, leading to, the creation of a single system with (potentially) billions of networked information devices and resulting in a Complexity Quagmire?

As such, the case can be made that all of the next generation paradigms, in one form or another, will require an autonomic–self-managing–infrastructure to be able to provide the successful reality of this envisaged level of pervasiveness, invisibility and mobility.

This talk reports on research and development, with examples from Biometric Identification and Tracking Systems, Autonomic Communications, and Space Exploration Systems, utilizing the biological metaphor of the autonomic nervous system to computing and communications, in which computer-based systems self-regulate by using automatic reactions to defend, optimize and heal.

Keywords*—*Wireless Autonomic Systems, Biometrics, Autonomic Communications, Space Exploration Systems

***Biography*—Roy Sterritt** is a member of Faculty at Computing and Engineering in the University of Ulster. He spent several years in industry with IBM, first at their UK headquarters in Portsmouth, and then at the IBM Hursley Labs in Winchester. Initially he was a Software Developer but then became a Product Development Manager with responsibility for tools to support risk assessment and project management in personal and mobile environments which were used widely in the UK and US. Roy's academic research career began in 1996 when he was appointed to the first of a series of joint University of Ulster and Nortel research projects investigating parallel, automated and intelligent approaches to the development and testing of fault management telecommunications systems.

Roy's main focus of research is Systems and Software Engineering of Autonomic (Self-Managing Computer-Based) Systems, essentially a research area developed from a call from industry to deal with the complexity and total cost of ownership of our systems of systems (IBM 2001). To date he has 175+ publications in the field including research collaborations with NASA, IBM TJ Watson Center, BT, SAP, HP and Core Systems as well as many academic partners. He is the founding chair of the IEEE Technical Committee on Autonomous & Autonomic Systems (TCAAS http://tab.computer.org/aas) and elected chair (2009-2011) of IEEE Technical Committee on Engineering of Computer-Based Systems (TCECBS http://tab.computer.org/ecbs). He has been appointed to the many editorial boards including the NASA Journal on Innovations in Systems and Software Engineering, AIAA Journal of Aerospace Computing, Information, and Communication, Journal of Autonomic and Trusted Computing, and Multiagent and Grid Systems - An International Journal.

In 2009, Roy is serving on the IEEE CS Publications board and chairing the Conference Publications Operations Committee (CPOC); and serving on the IEEE CS Technical & Conferences Activities Board (T&C excom) and chairing the Conference Advisory Committee (CAC).